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Serial No. 10/728,405
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Apparatus and Method for Building Support Piers From
One or Successive Lifts Formed in a Soil Matrix
Attorney Docket No. 04017.00066

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Amended Claims

Claims 1-59 are cancelled.

60. (Currently Amended) Apparatus for construction of a ~~soil reinforcement~~
multiple lift, compacted pier in a soil matrix comprising, in combination:

an elongate hollow tube having a longitudinal axis, a top material entrance end, an open bottom material discharge end and a first outer surface diameter; and a unitary, shaped bottom head element at the open discharge end having a second outside surface diameter greater than the first surface outside diameter and configured to provide a combination of axial and transaxial stress components ~~onto the soil matrix surrounding the bottom head element~~ upon lowering the hollow tube ~~into the soil matrix~~, said head element comprising a unitary attachment of the hollow tube; said head element including a leading bottom end ~~having~~ including a generally frustoconical configuration between the head element outside surface and a bottom discharge opening in the leading bottom end and a trailing end ~~having~~ including a generally frustoconical configuration; and

a ~~sacrificial~~ head element cap ~~closing~~ covering the bottom discharge opening; ~~open end of said bottom;~~

said bottom head element with said cap and said hollow tube being shaped for insertion in a soil matrix to effect displacement of the soil as the hollow tube with the bottom head element and said cap are lowered into the soil matrix to form a cavity in the soil matrix, the said cap being ~~disengageable and~~ at least partially removable from the bottom ~~head discharge opening element~~ as the hollow tube is subsequently raised from said formed cavity to allow material flow through the bottom discharge opening into the portion of the cavity vacated by the hollow tube and bottom head element, said bottom head element having a cross sectional shape and size greater than the cross sectional shape and size of the hollow tube to reduce frictional forces on the hollow tube when penetrating into and withdrawing from the soil matrix.

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61. (Withdrawn)

62. (Currently Amended) The apparatus of claim 60 ~~or 61~~ further including a fluid feed mechanism for directing a fluid material into the hollow tube and a solid material feed mechanism for feeding aggregate material into the hollow tube entrance end.

63. (Currently Amended) The apparatus of claim 60 ~~or 61~~ including aggregate in said hollow tube;

said hollow tube having a generally circular internal cross section and further including an aggregate feed mechanism connected to the top material entrance end for feeding items of aggregate material into said hollow tube wherein the minimum size of the internal diameter of the hollow tube is at least about 4.0 times the maximum size dimension of the largest item of aggregate material in said hollow tube.

64. (Currently Amended) The apparatus of claim 60 ~~or 61~~ further including at least one auxiliary feed tube connected to the hollow tube through openings in the hollow tube end for feeding fluid material into the hollow tube.

65. (Currently Amended) The apparatus of claim 60 ~~or 61~~ further including a hopper for feeding material into the hollow tube and at least one auxiliary feed tube connected to said hopper for feeding liquid material into the hollow tube.

66. (Currently Amended) The apparatus of claim 60 ~~or 61~~ or further including passageway openings in the hollow tube above the bottom head element for fluid materials within the hollow tube to flow out of the hollow tube above the bottom head element and outside of the hollow tube into an annulus formed between the hollow tube and the soil matrix.

67. (Currently Amended) The apparatus of claim 60 ~~or 61~~ further including a hopper feed mechanism connected to the top material entrance end of the hollow tube.

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68. (Currently Amended) The apparatus of claim 60 ~~or 61~~ further including a hopper and least one isolation damper connecting the hopper to the hollow tube.

69. (Currently Amended) The apparatus of claim 60 ~~or 61~~ further including a force mechanism connected to the hollow tube for providing a downwardly directing force on said hollow tube.

70. (Currently Amended) The apparatus of claim 60 ~~or 61~~ further including a force mechanism connected to the hollow tube for providing a downwardly directed static axial force.

71. (Currently Amended) The apparatus of claim 60 ~~or 61~~ including a force mechanism for providing a force on the hollow tube selected from the group consisting of a vertically reciprocating force, a vertically vibrating dynamic axial force, and combinations thereof.

72. (Currently Amended) The apparatus of claim 60 wherein said cap comprises a the sacrificial cap, comprises a combination of transaxial plate member for retention within the formed cavity and a rod member attached to the plate member and extending from the plate member generally axially into the head element and hollow tube.

73. (Currently Amended) The apparatus of claim 72 wherein the sacrificial cap comprises a transaxial plate member for retention at the bottom of a formed pier member, comprises a test element.

74. (Currently Amended) The apparatus of claim 72 wherein the cap further comprises at least one axial rod in combination with said plate member, comprises an uplift anchor pier element.

75. (Currently Amended) The apparatus of claim 60 ~~or 61~~ wherein the head element and hollow tube each have a uniform cylindrical cross sectional profile.

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Claims 76 through 85 are cancelled.

86. (New) The apparatus of claim 74 wherein at least one said rod extends axially from the bottom of a formed pier to above ground surface level.

87. (New) The apparatus of claim 60 wherein said cap comprises a mechanism for opening and closing said bottom discharge opening to allow material flow from the bottom discharge opening upon opening and to block material flow from the bottom discharge opening upon closing.

88. (New) The apparatus of claim 60 wherein said leading bottom end provides an energy imparting surface to compact aggregate in said cavity.